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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/593,922

09/24/2007

Paul A. Zank

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EXAMINER

BHAT, ADITYA S

ART UNIT

PAPER NUMBER

2863

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/593,922	ZANK ET AL.	
	Examiner	Art Unit	
	ADITYA BHAT	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/14/07.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 9/21/06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status

1. Claims 1-20 are currently pending in this application.

Priority

2. Currently, no foreign priority has been claimed.

Claim Objections

3. Claims 1-4, 6-9, 11-12, and 15-16 objected to because of the following informalities: the term E-field should be written out as electric field. Appropriate correction is required.

Information Disclosure Statement

4. Currently, no IDS has been submitted.

Drawings

5. The drawings submitted on 9/21/2006 are in compliance with 37 CFR § 1.81 and 37 CFR § 1.83 and have been accepted by the examiner.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim rejected under 35 U.S.C. 102(b) as being anticipated by Hilliard et al. (USPN 5,384,458).

With regards to claim 1Hilliard et al. (USPN 5,384,458) teaches a method for detecting the direction of an incoming round, comprising the steps of:

deploying an E-field sensor array having individual E-field sensors;(Col. 2,lines 34-36)
(Col. 3, lines 1-5)

determining the time difference of arrival of the round adjacent each of said E-field
sensors in the array;(col. 5, lines 9-29) and,

computing angle of arrival from the time differences. (Col. 9, lines 11-13)

It should be noted that it is well known in the art that the angle of arrival determines
direction by measuring the Time Difference of Arrival at individual elements of an array -- from
these delays the angle of arrival can be calculated.

With regards to claim 4 Hilliard et al. (USPN 5,384,458) teaches the E-field sensors are
located on the corners of a rectilinear shape. (figure 8)

103With regards to claim 4-5 and 17-18, Hilliard et al. (USPN 5,384,458) a rectilinear
shape that is a square. (figure 8) A square is formed as there is a sensing device on each corner
of the cross.

applicant's disclosure is absent the showing of criticality as to why the square shape is
vital to applicant's invention. Since the Hilliard et al. (USPN 5,384,458) clearly illustrates an
array of sensors that perform the same functions and arrive on the same results applicant must
show why this particular arrangement is novel over the prior art.

With regards to claims 9-10, Hilliard et al. (USPN 5,384,458) teaches the step of storing
all of the E-field outputs after a declared event wherein the angle of arrival is computed from the
stored outputs associated with a declared event. (Col.9, lines 45-50)

With regards to claim 12, Hilliard et al. (USPN 5,384,458) teaches separate angle of
arrival computations are made for different pairs of E-field sensors. (Col. 3, lines 1-4)

With regards to claim 16, Hilliard et al. (USPN 5,384,458) teaches a apparatus for detecting the direction of an incoming round, comprising:

an array of individual E-field sensors, each having an output; ;(Col. 2,lines 34-36) (Col. 3, lines 1-5)and,

a processor coupled to each E-field sensor to determine the time of closest approach of said round to the associated sensor and to determine angle of arrival from the time difference of arrival of the round at selected pairs of E-field sensors. (col. 5, lines 9-29)

With regards to claim 19, Hilliard et al. (USPN 5,384,458) teaches different pairs of sensors are used to compute angle of arrival, each resulting in an angle of arrival in different separate channels, and wherein said processor averages the results in each channel and compares the averaged results to an associated standard deviation, such that when the averaged results are within a predetermined standard deviation the presence of a round is declared as well as the direction of the trajectory of said round. (col. 5, lines 9-29)

With regards to claim 20, Hilliard et al. (USPN 5,384,458) teaches a display of the direction of said incoming round. (61; figure 1)(Col. 9, lines 42-44)

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2863

9. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hilliard et al. (USPN 5,384,458) in view of Foxlin et al. (USPN 6,314,055).

With regards to claims 2-3, Hilliard et al. (USPN 5,384,458) does not appear to teach detecting the zero crossover of the signals from each of the E-field sensors to detect the time of closest approach of the round to the sensor and the zero crossover is determined by a first partial derivative of dE/dT for each E-field sensor.

With regards to claims 2-3, Hilliard et al. (USPN 5,384,458) teaches detecting the zero crossover of the signals from each of the E-field sensors to detect the time of closest approach of the round to the sensor and the zero crossover is determined by a first partial derivative of dE/dT for each E-field sensor. (60;figure 5)

It would've been obvious to one of ordinary skill in the art at the time of the invention to modify the Hilliard et al. (USPN 5,384,458) reference to determine the zero crossover using a derivative taught by Foxlin et al. (USPN 6,314,055) in order to determine a more accurate position of the projectile.

10. Claim 6 discloses the step of computing angle of arrival includes using an arc-tan-2 function, with selected E-field sensor pair time differences of arrival used as the arguments for the arc-tan-2 function.

Applicants disclosure is absent the showing of criticality as to why using an arc-tan-2 function is critical to applicant's invention. As it is well known in the art the arc-tan-2 function is commonly used trigonometric function used to calculate angles. As this function is commonly used trigonometric function applicant must show why the use of this function is non-obvious over the prior art.

Art Unit: 2863

11. Claims 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hilliard et al. (USPN 5,384,458) in view of Kaminski (USPN 6,239,747).

With regards to claims 7-11 the step of filtering the outputs of the E-field sensors to remove E-field disturbances due to the local power line fields, storing the data and otherwise manipulating the sensed data in order to determine the location of the projectile.

Filtering unwanted components regardless of what causes the disturbance is a well known technique in the art. Applicant's disclosure is absent the showing of criticality as to why filtering would be a nonobvious modification.

Kaminski (USPN 6,239,747) teaches filtering (18) the outputs of the E-field sensors to remove E-field disturbances due, storing the data (34) and otherwise manipulating the sensed data in order to determine the location of the projectile. (figure 1)(s16;Figure 11)

It would've been obvious to one of ordinary skill in the art at the time of the invention to modify the Hilliard et al. (USPN 5,384,458) reference to filter, store and otherwise manipulate the data as it would be highly desirable to obtain a accurate position of the projectile without having unwanted disturbances and having the data for further review.

12. Claim 13-14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hilliard et al. (USPN 5,384,458)

With regards to claim 13-14, Hilliard et al. (USPN 5,384,458) teaches determining the standard deviation for each computed angle of arrival and for declaring the passage of a round, when the computed angle of arrival is less than the standard deviation.

While the Hilliard et al. (USPN 5,384,458) reference does not explicitly disclose calculating a standard deviation, Hilliard et al. (USPN 5,384,458) discloses measuring the

Art Unit: 2863

strength/intensity of the an electromagnetic of an incoming electromagnetic, thus allowing the electromagnetic field sensor apparatus to distinguish between electromagnetic wave fronts with in the field of view.

After careful analysis of applicant's claim it was determined that in this instance the standard deviation is being used as a threshold. When the angle is less then the standard deviation/threshold it is determined that there is a presence of a round. Although not identical the scope of the claimed invention is believed to be functionally equivalent to the measuring the strength/intensity of the an electromagnetic of an incoming electromagnetic, thus allowing the electromagnetic field sensor apparatus to distinguish between electromagnetic wave fronts with in the field of view.

13. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hilliard et al. (USPN 5,384,458)

With regards to claim 15, Hilliard et al. (USPN 5,384,458) teaches the direction of an incoming round is used for applications selected from the group consisting of man-carried E-field sensors, land vehicle-carried E-field sensors and aircraft-carried E-field sensors.

Applicants disclosure is absent the showing of criticality as to why using applications selected from this particular group is vital to applicant's invention. Since the Hilliard et al. (USPN 5,384,458) clearly illustrates an array of sensors that perform the same functions and arrive on the same results applicant must show why this method of use is novel over the prior art.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reisman et al. (USPN 4,328,938) teaches a roll reference sensor.

Art Unit: 2863

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADITYA S. BHAT whose telephone number is (571)272-2270.

The examiner can normally be reached on M-F 9-5:30.

16. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

17. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Aditya Bhat/
Examiner, Art Unit 2863
March 30, 2009